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EXAMINER
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11M1/1130

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ART UNIT

PAPER NUMBER

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DATE MAILED: 11/30/93

This is a communication from the examiner in charge of your application.
COMMISSIONER OF PATENTS AND TRADEMARKS

This application has been examined Responsive to communication filed on 3/4/93 This action is made final.

A shortened statutory period for response to this action is set to expire _____ month(s), _____ days from the date of this letter.
Failure to respond within the period for response will cause the application to become abandoned. 35 U.S.C. 133

Part I THE FOLLOWING ATTACHMENT(S) ARE PART OF THIS ACTION:

1. Notice of References Cited by Examiner, PTO-892. 2. Notice re Patent Drawing, PTO-948.
3. Notice of Art Cited by Applicant, PTO-1449. 4. Notice of Informal Patent Application, Form PTO-152.
5. Information on How to Effect Drawing Changes, PTO-1474. 6. _____

Part II SUMMARY OF ACTION

1. Claims 45-77, 79-180 are pending in the application.

Of the above, claims _____ are withdrawn from consideration.

2. Claims 1-44, 78 have been cancelled.

3. Claims 85, 90, 94, 95 are allowed.

4. Claims 45-77, 79-84, 86-89, 91-93, 96-180 are rejected.

5. Claims _____ are objected to.

6. Claims _____ are subject to restriction or election requirement.

7. This application has been filed with informal drawings under 37 C.F.R. 1.85 which are acceptable for examination purposes.

8. Formal drawings are required in response to this Office action.

9. The corrected or substitute drawings have been received on _____. Under 37 C.F.R. 1.84 these drawings are acceptable. not acceptable (see explanation or Notice re Patent Drawing, PTO-948).

10. The proposed additional or substitute sheet(s) of drawings, filed on _____ has (have) been approved by the examiner. disapproved by the examiner (see explanation).

11. The proposed drawing correction, filed on _____, has been approved. disapproved (see explanation).

12. Acknowledgment is made of the claim for priority under U.S.C. 119. The certified copy has been received not been received been filed in parent application, serial no. _____; filed on _____.

13. Since this application appears to be in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under Ex parte Quayle, 1935 C.D. 11; 453 O.G. 213.

14. Other

EXAMINER'S ACTION

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The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action. been received.

I. Rejections

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification is objected to under 35 U.S.C. § 112, first paragraph, as the specification, as originally filed, does not provide support for the invention as is now claimed.

Support is not found for the new term, "macroscopic quantities" that has been added to claims 86, 96, 102 - 108, 111 - 114, 119, 141, 162, and 165 - 168. Applicants rely on various portions of the disclosure in alleging support exists. Specifically, Applicants refer to the disclosure of "recoverable amounts," the x-ray diffraction of "crystals," the IR spectrum obtained from a 2 micron thick coating, and the fact that a specific color was observed. However, none of these disclosures require the presence of "macroscopic quantities." Microscopic quantities or less can be recovered, crystals are very often

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microscopic as opposed to macroscopic, x-ray and IR data can be obtained from less than macroscopic quantities, and color can be observed under a microscope. As to the 2 micron thick coating, there is no indication of record that such a small coating, i.e. 2 ten-thousandths of a centimeter, can in fact be seen.

Moreover, insertion of "macroscopic amounts" into the claims is not supported because the new phrase represents a broadening of the scope of the original disclosure. To illustrate, the literal language of the original disclosure supports the production of fullerene in quantities sufficient to produce coatings that are 2 microns thick. However, the new term "macroscopic amounts" extends the disclosure of the amount of fullerenes produced from this minimal amount to amounts far in excess, e.g. one ton of fullerenes. There is no disclosure supporting or describing larger quantities of fullerenes as embraced by the term "macroscopic amounts." Applicants have not specifically pointed out where support exists for the production of macroscopic quantities of C₇₀. The specification states that the product is only 2% C₇₀. If support for the production of macroscopic quantities of fullerenes in general is tenuous, then the question of whether macroscopic quantities of C₇₀ is supported by the disclosure of only 2% is C₇₀ is more in doubt.

The facts of the instant case are controlled by those of In re Barker, 194 USPQ 470 (CCPA 1977). In this case, the original

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disclosure contained drawings that showed contemplation of an embodiment of making prefabricated panels of wooden shingles where the backing board had lengths of four or eight feet with a repetitive series of eight or sixteen shingles per backing board. Id. at 471, 474. This disclosure was held not to support or describe an amendment requiring the backing board to have a length at least as great as the aggregate width "of at least six shingles." Id. at 474. Accordingly, the court did not allow extension of the disclosure from a backing board long enough to hold eight or sixteen shingles to a backing board long enough to hold "at least six shingles."

Claims 86, 96 - 108, 111 - 152, and 154 - 180 are rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth in the objection to the specification.

Claims 97 - 101, 109 -110, 115 - 118, 120 - 121, 133 - 140, 156, 158 -161, 171 - 180 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a) In claims 97 -101, 109 -110, 115 - 118, 120 - 121, 133 - 140, 158 -161, 171 - 180 the recitations of "amounts capable of . . ." being detected by various analytical instruments are indefinite. The lower limit of the quantities recited in the instant claims is unclear as detection limits of the recited

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instruments are subject to change, and may vary from instrument to instrument. For example, the Examiner takes Official Notice that the detection limits of a single beam IR vary significantly from that of a Fourier Transform IR. The claims do not specify which type of instrument serves as the standard. Further, the detection limits of any instrument vary with the type of sampling method used. Again, the instant claims are silent as to which sampling methods have been used to define the lower limits of the claim. Accordingly, the claims are indefinite as one of ordinary skill in the art would be unable to determine the metes and bounds of the claims with the information provided.

b) In claim 156 the recited Markush group is indefinite as the species are not mutually exclusive. Ex parte Clark, 174 USPQ 40 (Bd. of Appeals 1971). Note that several species are repeated. Also, "crystallization" embraces fractional crystallization and "column chromatography" can be considered to be generic to HPLC. It also appears that "fractionally" should be changed to "fractional."

Claims 133 - 134, 138, and 161 are rejected under 35 U.S.C. § 112, fourth paragraph, as being of improper dependent form for failing to further limit the subject matter of a previous claim.

These claims fail to limit the claims from which they depend requiring that macroscopic quantities be present. Note that a microphotograph may be taken of any substance, regardless of its

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quantity or size. Assuming Applicants intend to recite a limitation that requires that the crystals somehow be microscopic in size or quantity, such a limitation would be indefinite as being inconsistent with the independent claims, expressly requiring "macroscopic quantities."

35 U.S.C. § 101 reads as follows:

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title".

Claims 45-77, 79-83, 86-88, 91-93, and 96 - 180 (absent new matter) are rejected under 35 U.S.C. § 101 because the invention as claimed embraces products found in nature as shown by the Buseck et al. article. As set forth by the Commissioner of Patents and Trademarks, Official Gazette, 1077 O.G. 24 (1987):

Products found in nature will not be considered to be patentable subject matter under 35 USC 101 and/or 102. An article of manufacture or composition of matter occurring in nature will not be considered patentable unless given a new form, quality, properties or combination not present in the original article existing in nature in accordance with existing law. See e.g. Funk Bros Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 76 USPQ 280 (1948); American Fruit Growers v. Broqdex, 283 U.S. 1, 8 USPQ 131 (1931); Ex parte Grayson, Si USPQ 413 (Bd. App. 1941).

This rejection will apply to claims 86, 96, 102 - 108, 111 - 114, 119, 141, 162, and 165 - 168 only if Applicants delete the term "macroscopic amounts" in the claims. If Applicants elect not to cancel the term "macroscopic amounts" from these claims for appeal, this rejection over the claims containing the new

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term "macroscopic amounts" will be withdrawn.

Claims 45-77, 79-84, 86-89, 91-93, 96 - 180 (absent new matter) are rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103 as obvious over the Kroto et al. article in Nature, Vol. 318, p. 162, November 14, 1985 with the Curl et al. article in Scientific American, October 1991 page 54 cited to show an inherent state of fact.

This rejection will apply to claims 86, 96, 102 - 108, 111 - 114, 119, 141, 162, and 165 - 168 only if Applicants delete the new matter, "macroscopic amounts" in the claims. If Applicants elect not to cancel the term "macroscopic amounts" from these claims for appeal, this rejection over the claims containing the new term "macroscopic amounts" will be withdrawn.

As discussed in the Nature article, Kroto et al. detected C₆₀ and C₇₀ fullerenes in soot produced by the laser evaporation of graphite. The C₆₀ and C₇₀ were detected or measured by means of time of flight mass spectrometry, and the amount of C₆₀ and C₇₀ molecules produced was on the order of tens of thousands (see the Curl et al. article in Scientific American, October 1991, pg. 54, third column). The Examiner notes that the detection method used by Kroto et al. detected the C₆₀ and C₇₀ in the vapor state, thereby anticipating the instant claims 82, 86, 87 and 91.

The instant claims 48-51, 75, 81, 83, 88 and 91-93 require

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that the C₆₀ or C₇₀ be incorporated into a solid matrix. The disclosure of Kroto et al. inherently meets this requirement as solid particulate of free flowing soot is "formed" in the evaporation chamber. Given the well known stability of the fullerenes produced it is inherent that the fullerenes not directed to the mass spectrometer are inherently incorporated into the soot mixture, which is either amorphous or crystalline. Thus, the instant claims are anticipated in this respect. Also, the limitation that the product be formed and extended in at least one direction is noted. This is not seen to distinguish the instant product because the limitation reads on any particle that has a definite size. As to the "consisting essentially of" language of claims 45-47, the burden is on Applicants to show that the added component of the solid product of Kroto et al., i.e. soot, is contrary and inimical to the instant invention in terms of utility.

The instant claims 52, 73, 74, 76 and 79 are directly anticipated by the teaching of Kroto et al.. Note that immediately after the graphite is vaporized, the helium atmosphere in the apparatus of Kroto et al. contains a carbon product that comprises a mixture of C₆₀ and C₇₀. Regarding the instant claims that define the properties of C₆₀ and C₇₀ fullerenes such as the mass spectra, infrared spectra, UV spectra, solubilities, sublimation temperatures and color, the Examiner

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notes that these are all inherent properties of the C₆₀ and C₇₀ molecules produced and detected by Kroto et al. which have subsequently been confirmed in the art. It is also noted that the C₆₀ and C₇₀ of Kroto et al. is "formed" as the graphite is vaporized, thereby anticipating the instant claims 73 and 80. Regarding the instant limitations in claims 84 and 89 that the fullerenes be "substantially pure", as shown in Fig. 3 of the reference detection peaks for C₆₀ and C₇₀ are fully separated from other peaks thus indicating that the instrument has isolated the C₆₀ and C₇₀ from other substances in the matrix thus indicating that the two are "pure" or "substantially pure".

As to the instant product by process claims, for the reasons discussed above the C₆₀ and C₇₀ products of Kroto et al. are identical or only slightly different from that claimed. Thus, the instant product by process claims are rendered prima facie obvious by the teaching of Kroto et al. See MPEP 706.03(e).

Claims 45 - 77, 79 - 83, 87-88, 91-93, and 96 - 180 are rejected under 35 U.S.C. § 102(b) as being anticipated by the Kratschmer et al. article entitled "Spectroscopy of Matrix-Isolated Carbon Cluster Molecules Between 200 and 850 nm Wavelength."

The Kratschmer et al. article teaches a process of vaporizing graphite rods in an evacuated reactor under a slight

pressure of He gas (pages 815-816). Note that comparison of Figure 2 of the reference with the instant Figure 4 shows that the fullerenes inherently produced by the process were detected by UV. Because Applicants admit that macroscopic quantities are required to obtain UV data (see Response dated March 4, 1993, page 11, lines 13 - 15), the Kratschmer et al. product inherently contains macroscopic amounts of fullerenes.

II. Response to Applicants' Arguments

Applicant's arguments filed March 4, 1993 have been fully considered but they are not deemed to be persuasive.

In response to the rejection made under 35 U.S.C. 101 citing Buseck et al. to show that the subject matter as claimed occurs in nature, Applicants assert that the claimed invention takes on a new form than the natural material of Buseck et al. and is therefore patentable under section 101. From the arguments offered, this new form appears to lie in the quantity and purity of the fullerenes. However, there are no limitations in the rejected claims (other than the new term "macroscopic") to distinguish the quantity and purity of the claims from those described to occur in nature by the reference. It is noted that the fullerenes contained in the shungite rock are solid, as admitted by Applicants (see Response dated March 4, 1993, page 17, lines 22 -23). In short, Applicants' arguments are not persuasive because they are not commensurate in scope with the

rejected claims.

Applicants' citations of case law are not persuasive as the district court and 4th Circuit cases have not been adopted by the Federal Circuit and are therefore not controlling authority.

Regarding the rejection made under 35 U.S.C. 102(b) over the Kroto et al. article, Applicants contend that this reference is not enabling. However, Applicants' citation to United States v. Teletronics, Inc., 857 F.2d 778 (Fed. Cir. 1988), stating that the test of enablement is whether one of ordinary skill in the art could make the invention as claimed from the disclosure of the reference supports the fact that the Kroto et al. article is enabling. The Kroto et al. article gives a detailed description on how the fullerenes were made in quantities on the order of tens of thousands of molecules (see Figure 2). The claims rejected over this reference read on the quantities of fullerenes made by Kroto et al.. Accordingly, the Kroto et al. article enables one of ordinary skill in the art to make the instant product as claimed. Applicants apparently allege that the Kroto et al. article states that attempts to make the claimed fullerenes failed. No such statements have been found nor pointed out in the reference. The argument that the step of slurring the soot produced by Kroto et al. with benzene did not produce a colored solution speaks to the quantity of fullerenes produced, and does not preclude the inherent production of trace

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amounts of solid fullerenes in the soot as described in the rejection. Again, the rejected claims read on trace quantities of fullerenes.

At this point, the Examiner notes that the instant claims 85, 90, 94, and 95 are allowable over the prior art of record.

III. Additional Matters

As to the Information Disclosure Statement filed June 24, 1992, the references crossed out therein were not in compliance with 37 CFR 1.98(a)(2) as copies of these references were not received.

The Blau et al. article entitled "An Investigation of the Microfrictional Behavior of C₆₀ Particle Layers on Aluminum" is cited as pertinent to lubricants.

Applicant's amendment necessitated the new grounds of rejection. Accordingly, **THIS ACTION IS MADE FINAL**. See M.P.E.P. § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 C.F.R. § 1.136(a).

A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. § 1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

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Any inquiry concerning this communication should be directed to Stephen Kalinchak at telephone number (703) 308-1093.

SK

S. Kalinchak/rw
November 30, 1993

Michael L. Lewis

Michael Lewis
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